

TWO NEW SPECIES OF *FESTUCA* FROM SOUTH AMERICA (POACEAE: LOLIINAE: SECT. SUBULATAE)

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ABSTRACT

Two new species, *Festuca cuzcoensis* Stančík & P.M. Peterson and *F. towarensis* Stančík & P.M. Peterson, from the Andes of Bolivia and Peru are described and illustrated. The two new species appear to be closely related to *Festuca flacca* Hack. ex E.B. Alexeev from Ecuador. A key to the South American species of *Festuca* sect. *Subulatae* is given.

RESUMEN

Se describen e ilustran dos especies nuevas de *Festuca* de los Andes de Bolivia y Perú: *F. cuzcoensis* Stančík & P.M. Peterson y *F. towarensis* Stančík & P.M. Peterson. Las nuevas especies se consideran estrechamente relacionadas con la especie *F. flacca* Hack. ex E.B. Alexeev de Ecuador. Además se presenta una clave para la determinación de las especies de *Festuca* sect. *Subulatae* en Suramérica.

While making determinations of South American material in the United States National Herbarium the senior author recognized several specimens with unique features. The two new species discussed here appear to be members of *Festuca* subg. *Subulatae* (Tzvelev) E.B. Alexeev sect. *Subulatae*. The position of sect. *Subulatae* in subg. *Subulatae* is clear, however, the relationships with other sections in this subgenus are unresolved. Alexeev (1980, 1982, 1986) recognized three sections in subg. *Subulatae*: sect. *Subulatae*, sect. *Elmera* E.B. Alexeev, and sect. *Glabricarpae* E.B. Alexeev. Alexeev (1986) and Clayton and Renvoize (1986) also recognized two other subgenera in these flat-bladed South American species of *Festuca*: subg. *Subuliflorae* E.B. Alexeev and subg. *Obtusae* E.B. Alexeev. Aiken's et al. (1997) treatment included species of subg. *Subuliflorae* and subg. *Obtusae*, sensu Alexeev, in subg. *Subulatae* sect. *Obtusae*, and moved a single species from sect. *Elmera*, sensu Alexeev, to sect. *Subulatae*. In addition, Lu (1992) described sect. *Longiglumes* S.L. Lu to include some Chinese species within subg. *Subulatae*. Clearly, there are considerable differences of opinion among prominent agrostologists as to possible taxonomic relationships among these *Festuca* species.

Section *Subulatae* consists of about 25 species from North and South America, Asia, and Africa (Aiken et al. 1997; Alexeev 1977, 1980, 1988; Lu 1992; Stančík ined.). Individuals of *Festuca* sect. *Subulate* are typically loosely tufted

with extravaginal innovations lacking cataphylls, with flat blades without well-developed ribs, and have relatively large, open panicles with numerous branches. In this section the spikelets are typically lanceolate with two short, entire, and narrow glumes that are membranous to coriaceous/membranous. The coriaceous/membranous lemmas are lanceolate, entire, and usually long-awned or rarely awnless. Anthers are short (1–2 mm long) and the ovary hairy, rarely glabrous. The two new species discussed here clearly are members of subfamily Pooideae, tribe Poeae, and subtribe Loliinae (Soreng et al. 2001). With the addition of these two new species in South America, *Festuca* sect. *Subulatae* consists of the following eight species: *F. cochabambana* E.B. Alexeev, *F. coromotensis* Briceño, *F. cuzcoensis*, *F. flacca* Hack. ex E.B. Alexeev, *F. parodiana* (St.-Yves) Nicora, *F. sodiroana* Hack. ex E.B. Alexeev, *F. towarensis*, and *F. ulochaeta* Nees ex Steud.

Festuca cuzcoensis Stančík & P.M. Peterson, sp. nov. (**Fig. 1**). TYPE: PERU. DEPARTAMENTO CUZCO. Provincia Urubamba: above Ollantaytambo, in shade, high up ravine, 3600 m, 5 Dec 1923, A.S. Hitchcock 22532 (HOLOTYPE: US-1164548!).

Festuca ulochaeta auct. non Nees ex Steud: Hitchcock 1927, 321 p.p. Macbride 1936, 123 p.p. Tovar 1993, 90 p.p.

Haec species a *Festuca ulochaeta* Nees ex Steud. et *F. towarensis* Stančík & P.M. Peterson culmis multinodis (6–12 non 2–4) et aristae brevi [3–4 (–5) non 5–12 mm] differt. A *Festuca ulochaeta* Nees ex Steud. et *F. cochabambana* E.B. Alexeev ligula folii 2–3 (non 0.2–2) mm longa distinguitur.

Perennial, loosely tufted. Culms 80–110 cm tall, erect, glabrous, with 6–12 nodes in basal half, the internodes short. Sheaths membranous, brown, more or less pubescent, margins free; innovations extravaginal; auricles absent. Ligules 2–3 mm long, membranous, acuminate, dentate. Blades 12–15 cm long, 3–9 mm wide, flat, green, scabrous on ribs of abaxial surface. Panicles 20–25 cm long, 5–10 cm wide, open; branches pendant, scabrous. Spikelets 8–10 mm long; florets 3–4 (perfect); rachilla 1.2–1.4 mm long, puberulent. Glumes narrowly lanceolate, coriaceous, purplish, scabrous, apex acute; lower glume (2–)2.5–4.5 mm long, 1-veined; upper glume 4–6 mm long, inconspicuously 3-veined. Lemma 7–8.5 mm long, lanceolate, chartaceous to membranous, 3- or 5-veined, purplish-green; apex scabrous, entire; awn 3–4(–5) mm long, scabrous, straight. Palea almost as long as lemma, 2-keeled, the keels finely scabrous, deeply 2-dentate. Lodicules oblong, 2-dentate. Stamens 3; anthers (1.2–)1.5–2 mm long. Ovary apex with a few hairs. Caryopses lanceolate.

Distribution and habitat.—This species was collected in Andean forest zone of Peru and northeastern Bolivia between 3200–3850 m.

Etymology.—The specific epithet refers to the type locality region, i.e., Department Cuzco in southern Peru.

Additional specimens examined: **BOLIVIA. Departamento La Paz:** Unduavi, in Walden, 3300 m, 12 Feb 1907, Buchtien 6415 (US). **PERU. Departamento Ancash. Prov. Yungay:** Huascarán National Park,

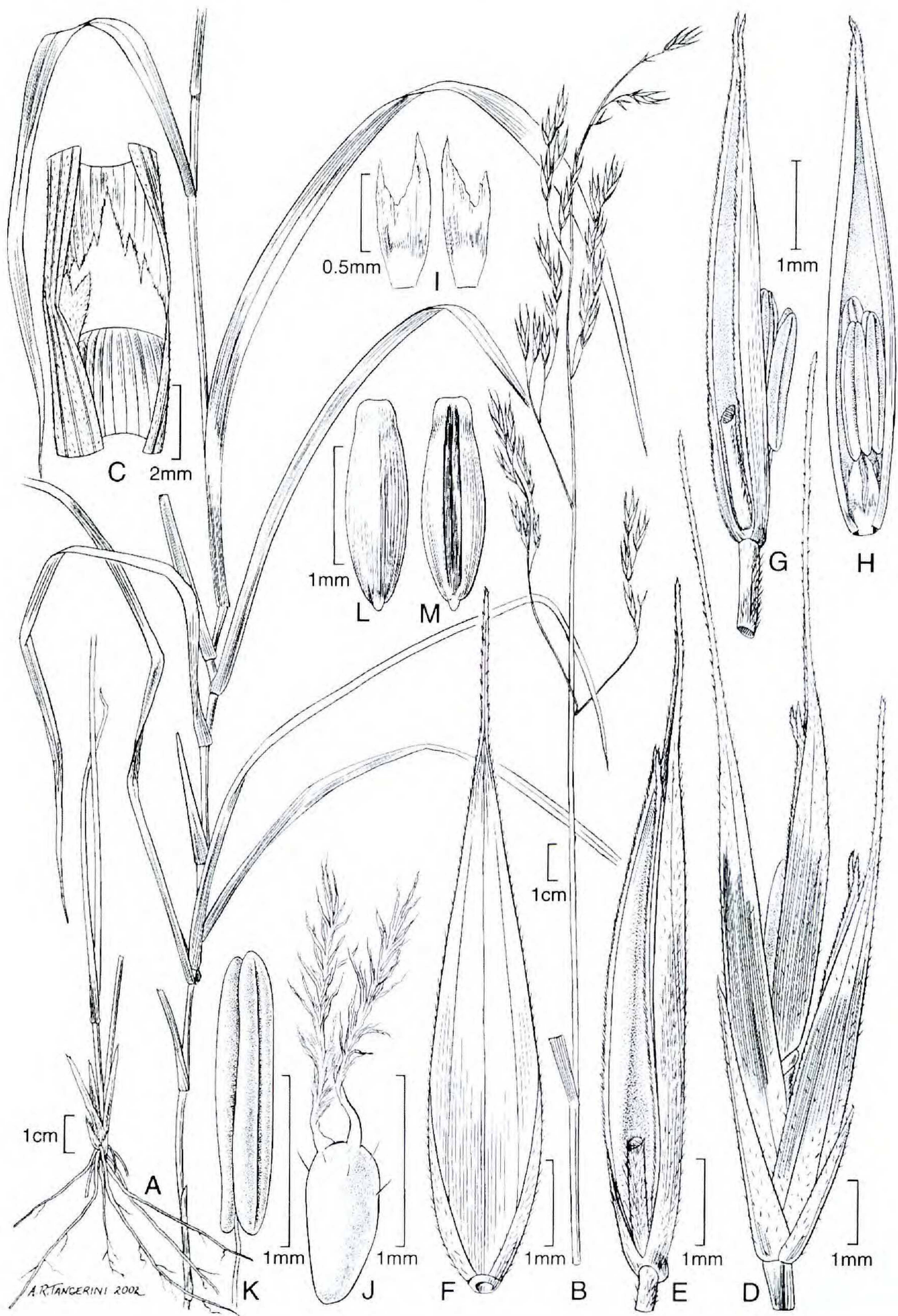


FIG. 1. *Festuca cuzcoensis* (Hitchcock 2253). A. Habit. B. Inflorescence. C. Sheath, ligule, and portion of a blade. D. Spikelet. E. Floret. F. Lemma, ventral view. G. Palea with stamens. H. Palea, with stamens and lodicules. I. Lodicules. J. Pistil. K. Stamen. L. Caryopsis, dorsal view. M. Caryopsis, ventral view.

Llanganuco sector, between Chinancocha and Pucayacu (77° 39' W-09° 05' S), 3700–3850 m, 7 May 1985, *Smith 10517* (USM); *Smith 10551* (USM); *Smith 10561* (USM). **Prov. Huari:** Huascarán National Park, Quebrada Pachachaca, a lateral valley of Quebrada Rurichinchay (77° 16' W-9° 23' S), 3840–3870 m, 13 Jun 1986, *Smith et al. 12632* (USM). **Departamento Cuzco. Prov. Calca:** 7 km SE of Lares on road towards Pampa Corral and Calca (13° 08' 49.9" S-72° 00' 34.2" W), 3620 m, 17 Mar 2002, *Peterson & Refulio-Rodriguez 16582* (PRC, US, USM). **Departamento Huancavelica. Prov. Tayacaja:** Near Salcabamba, 3200 m, 13 Apr 1962, *Tovar 3612* (USM).

Festuca tovaensis Stančík & P.M. Peterson, sp. nov. (**Fig. 2**). TYPE: PERU. Departamento Huancavelica, Provincia Tayacaja: Chuspi-Hda. Tocas, entre Colchabamba y Paucarbamba, monte bajo, 2800 m, 22 Apr 1954, *O. Tovar 2057* (HOLOTYPE: US-2181286!; ISOTYPE: USM!).

Festuca ulochaeta auct. non Nees ex Steud: Tovar 1993, 90 p.p. Brako L. et al. 1993, 950.

Haec species a *Festuca ulochaeta* Nees ex Steud. lemmate brevior (5.5–6.5 non 6–9 mm), arista 5–7 (non 7–15) mm longa et recta (non flexuosa) differt. A *Festuca flacca* Hack. ex E.B. Alexeev ligula folii 1–2 (non 2–4.5) mm longa, truncata et ciliata (non lacerata), glumis superioribus 3.5–5 (non 2.3–3.5) mm et antheris 1.5–1.6 (non 0.9–1.2) mm distinguitur.

Loosely tufted perennials. Culms 70–90 cm tall, erect, glabrous, with 2–4 nodes in basal half. Sheaths membranous, brown, margins free; innovations extravaginal; auricles absent. Ligules 1–2 mm long, membranous, truncate, margins ciliate. Blades 8–15 cm long, 1.5–4.5 mm wide, linear, flat, green, scabrous with ribs on abaxial surface. Panicles 15–20 cm long, 7–10 cm wide, open; branches pendant, scabrous. Spikelets 7.5–9.5 mm long; florets 3 (perfect); rachilla 1.1–1.4 mm long, puberulent. Glumes narrowly lanceolate, coriaceous, purplish, glabrous, apex acute (sometimes scabrous); lower glume 1.5–1.8 mm long, 1-veined; upper glume 3.5–4.5(–5) mm long, 1–3 veined. Lemma 5.5–6.5 mm long, lanceolate, chartaceous to membranous, 3-veined, purplish-green, scabrous; apex entire; awn 5–7 mm long, terminal, scabrous, straight. Palea as long as lemma, 2-keeled, the keels scabrous; apex hairy, deeply 2-dentate. Lodicules ca. 0.8 mm long, lanceolate, acuminate. Stamens 3; anthers 1.5–1.6 mm long. Ovary sparsely hairy near apex. Caryopses lanceolate; hilum linear, 2/5–1/2 of total length.

Distribution and habitat.—This species is known only from the Andean forest zone of Peru, at 2500–3250 m.

Etymology.—The specific epithet honors the eminent Peruvian botanist and agrostologist, Oscar Tovar Serpa.

Additional specimens examined: **PERU. Departamento Ayacucho. Prov. Huanta/La Mar. Tambo:** Wolken-Nebel-Buschwald, 37 km to Ayna, 3250 m, 23 Mar 1977, *Ellenberg 7024* (USM). **Departamento Cajamarca. Prov. Cajamarca:** Road to Yumagual, 2500 m, 26 Jun 1966, *Vega 249* (USM).

DISCUSSION

In South America sect. *Subulatae* is represented by eight native species (Table 1). In this table we compare the salient morphological features that distinguish these taxa, including the North American species, *F. subulata* Trin. All the spe-

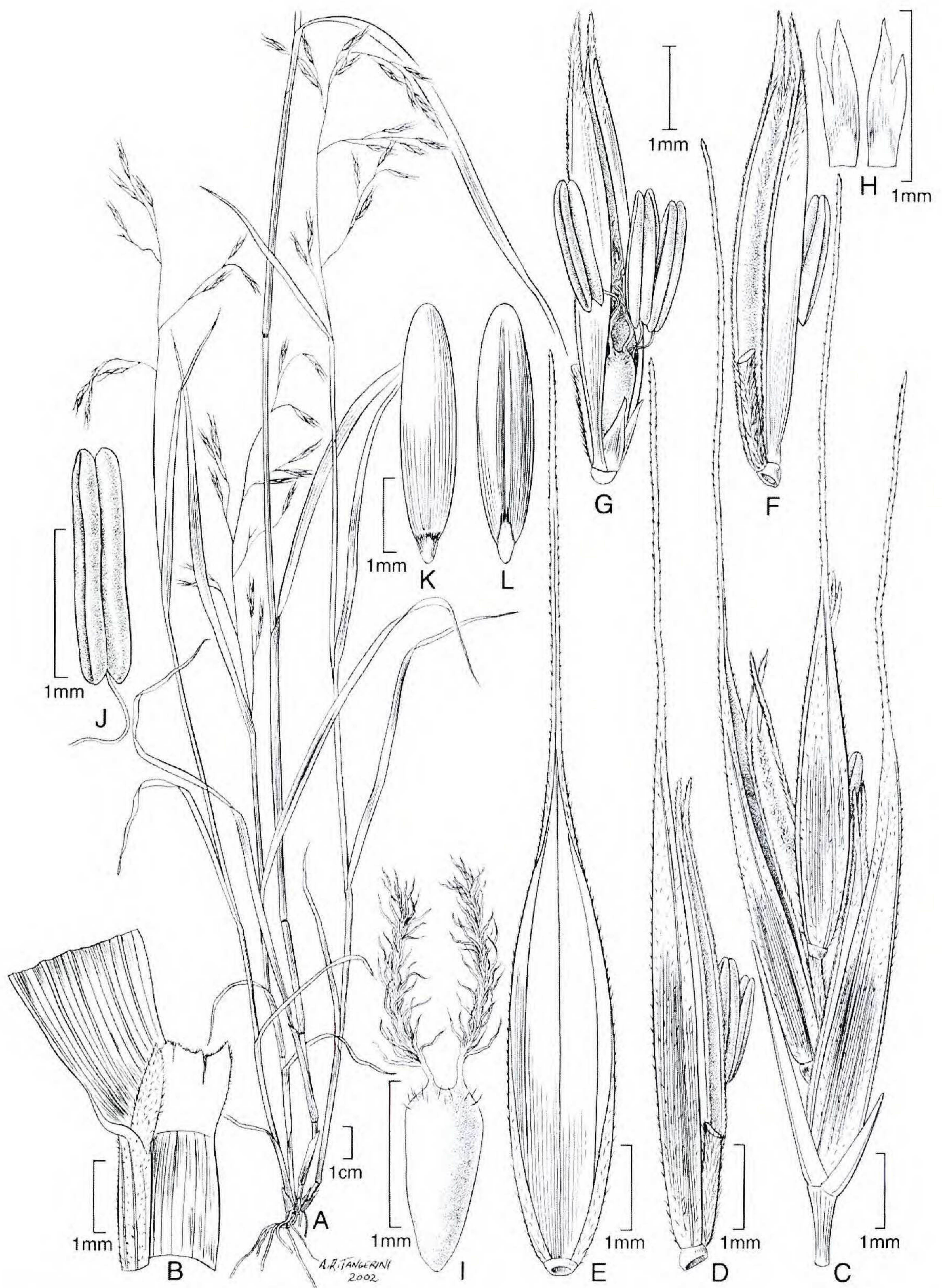


FIG. 2. *Festuca towarensis* (Tovar 2057). A. Habit. B. Sheath, ligule, and portion of a blade. C. Spikelet. D. Floret. E. Lemma, ventral view. F. Palea with stamen. G. Palea, with lodicules, pistil, and stamens. H. Lodicules. I. Pistil. J. Stamen. K. Caryopsis, dorsal view. L. Caryopsis, ventral view.

TABLE 1. Morphological comparison of the South American species of *Festuca* sect. *Subulatae* and the North American *Festuca subulata*.

Taxon	<i>F. coromotensis</i>	<i>F. cochabambana</i>	<i>F. ulochaeta</i>	<i>F. cuzcoensis</i>	<i>F. towarensis</i>	<i>F. flacca</i>	<i>F. sodiroana</i>	<i>F. parodiana</i>	<i>F. subulata</i>
geographical distribution	Venezuela	Bolivia	Argentina, Brazil, Colombia, Venezuela	Peru, Bolivia	Peru	Ecuador	Ecuador, Colombia	Argentina	North America
culm nodes	3–5	3–4	2–4	6–12	2–4	3–7	2–4	5–7	3–4
ligule size (mm)	0.5–1	0.2–0.7	0.3–1(–2)	2–3	1–2	3–3.5	0.5–1.1	1–2	0.5–1
form of ligule	truncate	truncate	truncate	acuminate	truncate	acuminate	truncate	truncate	truncate
spikelet size (mm)	11–15	9–10	9–12	8–10	7.5–9.5	7–8	7.5–9	10–13	8–10
number of florets	3–4	4–5	3–5	3–4	3	2–4	4–5(–6)	4–6	3–4
lower glume size (mm)	2.5–3	1.8–2.2	2.5–3.5(–4)	(2–)2.5–4.5	1.5–1.8	1.2–2.4	1.2–1.8	2–2.5	2.5–4
upper glume size (mm)	4.8–5.5	2.7–3.2	3.5–4.5	4–6	3.5–4.5(–5)	2.5–3.5	2.0–2.9	3–4	3.5–5
lemma size (mm)	8–8.5	5.5–6.2	6–8(–9)	7–8.5	5.5–6.5	6.5–7	5–6.5	7–8	6–8
awn size (mm)	0–0.5	6–12	7–15	3–4(–5)	5–7	9–12	awnless	awnless	5–10
form of awn	straight	straight	flexuous	straight	straight	straight	awnless	awnless	straight
anthers size (mm)	1.2–2	1–1.2	1.1–1.5	(1.2–)1.5–2	1.5–1.6	1.1–1.4	0.8–1.2	1.3	1.5–2
tip of ovary	glabrous	hairy	sparsely hairy	sparsely hairy	sparsely hairy	sparsely hairy	glabrous	hairy	hairy

cies are morphologically very similar to one another. However, *F. ulochaeta* can be easily separated from the remaining seven species by having long-awned lemmas with the awn flexuous whereas the other taxa have straight awns or awnless lemmas. *Festuca cuzcoensis* and *F. towarensis* are possibly most closely related to *F. flacca* since all three share lanceolate spikelets of the same size, 2–4 florets per spikelet, straight awns 3–12 mm long, and small anthers 1.1–2 mm long. *Festuca cuzcoensis* differs from *F. towarensis* by having 6–12 nodes per culm (2–4 nodes in *F. towarensis*), acuminate ligules (verses truncate), lower glumes (2–)2.5–4.5 mm long (verses 1.5–1.8 mm), lemmas 7–8.5 mm long (verses 5.5–6.5 mm), and a glabrous ovary (verses sparsely hairy). *Festuca parodiana* shares the following characteristics with *F. sodiroana*: truncate ligules, 4–6 florets per spikelets, and awnless lemmas. However, *F. parodiana* can be separated from *F. sodiroana* by having a hairy (glabrous in *F. sodiroana*) ovary, lower glumes 2–2.5 mm long (verses 1.3–1.8 mm), upper glumes 3–4 mm long (verses 2.2–2.9 mm), lemmas 7–8 mm long (verses 5–6.5 mm), and 5–7 nodes per culm (verses 2–4). *Festuca coromotensis* is almost awnless (mucronate) but differs from *F. sodiroana* and *F. parodiana* by having large, scabrous lemmas 8–9 mm long. There appears to be a geographic component as well since the principal area of distribution for *F. ulochaeta* is southeastern Brazil and northeastern Argentina with new range extensions reported from the Cordillera Oriental of Colombia and Cordillera de Mérida in Venezuela (Stančík 2001). The remaining seven species occur exclusively in the montane forest zone of the Andes in small endemic populations ranging from Argentina in the south to Colombia and Venezuela in the north. *Festuca elviae* Briceño, a Venezuelan species, is also a possible member of *Festuca* sect. *Subulatae*. However, further study is needed to confirm its inclusion in this section.

KEY TO THE SPECIES OF *FESTUCA* SECT. *SUBULATAE* IN SOUTH AMERICA

1. Lemmas awnless or with a mucro to 0.5 mm long.
 2. Lemmas 8–9 mm long, densely scabrous _____ **F. coromotensis**
 2. Lemmas 6.5–8 mm long, glabrous or papillate.
 3. Culms with 2–4 nodes; lower glumes 1.2–1.8 mm long; upper glumes 2.0–2.9 mm long; lemmas 5–6.5 mm long; ovary glabrous _____ **F. sodiroana**
 3. Culms with 5–7 nodes; lower glumes 2–2.5 mm long; upper glumes 3–4 mm long; lemmas 7–8 mm long; ovary hairy _____ **F. parodiana**
1. Lemmas with awn 3–15 mm long.
 4. Lemma awns markedly flexuous, 7–15 mm long _____ **F. ulochaeta**
 4. Lemma awns straight, 3–12 mm long.
 5. Sheaths pubescent _____ **F. cochabambana**
 5. Sheaths glabrous, rarely scabrous.
 6. Lower glumes (2–)2.5–4.5 mm long; lemma awns 3–4 mm long _____ **F. cuzcoensis**
 6. Lower glumes 1.2–2.4 mm long; lemma awns 5–12 mm long.

7. Ligules 2–3.5 mm long; upper glumes 2.5–3.5 mm long; lemma awns 9–12 mm long _____ **F. flacca**
7. Ligules 1–2 mm long; upper glumes 3.5–4.5(–5) mm long; lemma awns 5–7 mm long _____ **F. towarensis**

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